

Paradise Whydahs *Vidua paradisaea* and *V. obtusa* of southern and eastern Africa, with notes on differentiation of the females

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In the southern half of Africa are two kinds of paradise whydahs. In one (*Vidua paradisaea*) the male has a long, tapering tail, and in the other (*V. obtusa*) it has a more broad, rounded, somewhat shorter tail. The whydahs are brood parasites and lay their eggs in the nests of the Melba Finch, *Pytilia melba*, and the Orange-winged Melba Finch, *P. afra*, respectively, and they mimic the songs of the foster species (Nicolai 1964, 1969). Although the whydahs live together in some areas without hybridizing, they have been regarded as conspecific (Friedmann 1960). Chapin (1922) at one time recognized that two species lived in southern Africa, but later he regarded the two as conspecific because no differences were known in their females (Chapin 1954: 579). After Nicolai's observations on vocal mimicry of the whydahs were published, the distribution of the whydahs and their *Pytilia* song models were mapped by Irwin & Benson (1967) and by Hall & Moreau (1970), showing that the distribution of *V. paradisaea* corresponds closely to the distribution of *P. melba* in relatively dry areas of southern and east Africa, and *V. obtusa* occurs within the range of *P. afra* in the more humid areas.

During a field study in 1965-68 in Africa my wife Karen and I collected paradise whydahs both in areas of allopatry and in areas where the two kinds occur together. By examining these specimens and others taken in the areas where only a single form of whydah and a single *Pytilia* species occur, we could compare the morphological features of females of known identity. The local vegetation, ecology, and evidence for the occurrence of only a single species of whydah and of *Pytilia* are detailed below to document the basis of identification of the females, and notes on breeding condition and behaviour are included to confirm their breeding status. Specimens collected are now in the University of Michigan Museum of Zoology.

Bases for identification in areas of allopatry, with notes on distribution, ecology, and breeding

Marble Hall, Transvaal: Throughout the Transvaal *Pytilia melba* is common in brushy woodlands, but *P. afra* is restricted to the NE corner along the moist escarpment (McLachlan & Liversidge 1957). *Vidua paradisaea* lives in the same areas as *P. melba*, whereas *V. obtusa* has been reported only from the moist escarpment region. I saw adult males of *paradisaea* in 14 localities in northern and central Transvaal, and at Merensky Reserve (23°39'S, 30°40'E) I heard it mimic several vocalizations of *P. melba*, the only local *pytilia*. Male *paradisaea* also mimicked this finch near Marble Hall; the mimetic song was a "hee, yoo-wee". On a farm 21 mi. west of Marble Hall, 2100' elevation on Springbok Flats (24°51'S, 28°58'E), *paradisaea* was abundant and I saw at least 30 males within two miles east and west from February to April, 1966; I collected two ♂♂ here. From 8th February to 8th March 1966, I collected 18 adult female Paradise Whydahs at the farm. All showed evidence of breeding and had either recognizable fresh post-ovulatory follicles or yolky ovarian follicles larger than 7 mm; ten ♀♀ had an egg in the oviduct. At the Lowvelt Fisheries Research Station (25°00'S, 29°19'E), 10 mi. east of Marble Hall, we spent three weeks during the summers of 1966 and 1967 and saw adult male

paradisaea nearly every day and *P. melba* occasionally. No other paradise whydah or pytilia species were seen here, nor were they at Springbok Flats. On 6th March 1966 I collected a female whydah with a hard egg in the oviduct; it was shot from the same bush where I had photographed a male Acacia Paradise Whydah *V. paradisaea* at the fisheries. On distributional grounds it is clear that these Marble Hall area female whydahs all represent *V. paradisaea*, and they are so identified in Table 1.

Table I
Wing length of female paradise whydahs in southern and east Africa

Locality	No. specimens	Wing length, mm			$\frac{s}{95}$ $\frac{9}{x}$
		Max.	Min.	Mean	
<i>Vidua paradisaea</i>					
Marble Hall, Transvaal	18	79	73	76.11	.90
Sabi Valley, Rhodesia	3	76	74	75.0	—
Botswana	5	77	76	76.6	—
South-West Africa	3	77	75	76.0	—
Lilongwe, Malawi	2	74	74	74.0	—
Ologesailie, Kenya	4	75	74	74.5	—
TOTAL	35	79	73	75.74	.53
<i>Vidua obtusa</i>					
Tzaneen, Transvaal	1	—	—	79.	—
Mwinilunga, Zambia	11	84	77	79.73	1.62
Kasaji, Katanga	16	86	77	80.25	1.29
TOTAL	38	86	77	80.00	.94

Tzaneen, Transvaal: At the moist base of the escarpment of the northeastern Transvaal (=five miles east of Tzaneen) *Pytilia afra* was seen on 11th February 1967, and *Vidua obtusa* males were seen here on the same orange farm of A. C. Raines (Payne 1967a; specimens of *obtusa* in NMR [Bulawayo] and UMMZ [Ann Arbor]). We also saw a male *obtusa* one mile north of Letsitele on 24th June 1967, about six miles from the earlier sightings. In two weeks of field work in 1966 and 1967 at Tzaneen I saw no *P. melba* or *V. paradisaea*, and in January 1966, before I had seen any whydahs at Tzaneen, Archie Van Reenen, who had an orange farm 4 mi. east of Tzaneen, told me that the local whydahs looked like the "Broad-tailed Paradise Whydahs" (*V. obtusa*) illustrated in McLachlan & Liversidge (1957: 451). Because *V. obtusa* males are the only form known at Tzaneen and because the female whydah taken there was with a breeding male, I call the Tzaneen female *obtusa* in Table 1.

Botswana: Both *Pytilia melba* and *Vidua paradisaea* are widespread in northern Botswana (Smithers 1964). *P. afra* is apparently unknown, and a single specimen of a male *V. obtusa* was taken from Panda-ma-Tenga, on the Rhodesian border in extreme northeastern Ngamiland. I saw male *V. paradisaea* in breeding plumage at six localities in central and western Ngamiland and *P. melba* at three of these in April 1967. A ♀ that I shot from a flock of six *V. paradisaea* 6 mi. S Shorobe on 21st April had recently begun the postnuptial moult (some head and breast feathers were growing); it had probably bred here as its ovary had not fully regressed, and the largest ovarian follicle was 1.5 mm and the convoluted oviduct was still somewhat enlarged. I also saw *P. melba* here on the same day. Female whydahs included in Table 1 as *V. paradisaea* were from Francistown 3700' (NMR 2), "Kalahari 3200'" (MRAC [Tervuren] 1), Shorobe 5 mi. SW (UMMZ 1), and Swartruggens (FMNH [Chicago] 1).

South-West Africa: In this dry country *Pytilia melba* is widespread but *P. afra* is unknown (McLachlan & Liversidge 1957; Immelmann *et al.* 1965). Similarly adult ♂♂ *Vidua paradisaea* have been taken in South-West Africa near Kamerjab at 4000' (BM[NH]) and in "Ovampoland" (Berlin Museum) but *V. obtusa* is unknown. The country is dry and it would be surprising to find the wetter-country finches here. On the basis of the semi-arid habitat I include in Table 1 as *V. paradisaea* three females in the Berlin Museum taken by W. Hoesch from Erongo Plateau; these are the only ♀♀ paradise whydahs known to me from this country. They were taken during August and September 1937; the only one with breeding condition information had a small ovary on 5th September.

Sabi Valley, Rhodesia: The river bottom land along the Sabi River at 1400' on the Sabi Valley Experimental Station (20°20'S, 32°18'E) is hot and dry; mean annual rainfall is about 16 inches (I. MacFadyen, pers. comm.). Dominant vegetation is acacia (mostly *Acacia tortilis*) and mopane (*Colophospermum mopane*) open woodland with a rich grass cover. The rather dry nature of this palce is indicated by baobabs (*Adansonia*) though south of the station are seasonally flooded pans. In a list of the birds of this area, Brooke & Cackett (1965) note that *Pytilia melba* occurs but *P. afra* does not; they report that *Vidua paradisaea* is an "irregular visitor" and *V. obtusa* is "rare". I saw *P. melba* several times but no *P. afra*. Between 12 mi. N and 2 mi. S of the station I saw at least 22 adult ♂♂ *paradisaea* in breeding plumage from 3rd to 9th March 1967 and more from 4th to 6th April 1967. Several were heard to mimic the songs of *P. melba*. I collected six adult ♂♂ including two that looked at first like *obtusa* because they lacked the elongated second pair of rectrices, but both were identified in the field before they were taken as *paradisaea* on the basis of the pale yellowish nape (not dark orangish as in ♂♂ *obtusa*). The one bird with an intact first pair of rectrices (these are about half the length of the second pair and are slightly rounded) looks somewhat like the shorter-tailed ♂♂ *obtusa* in their full breeding plumage. I saw no *V. obtusa* on the alluvial plains but did on the Chipinga road on the escarpment at 3000' (20°07'S, 32°38'E), a mile above Buffels Drift. The three female whydahs I shot at the Sabi Valley station all had yolky ovaries. One had two large post-ovulatory follicles (4.1, 1.9 mm) and an egg in the oviduct, and the other had two large (3.8, 2.5 mm) post-ovulatory follicles. As these females were all breeding at Sabi Valley they are regarded as *V. paradisaea*.

Lilongwe, Malawi: At 3600' by Mbabzi village (13°56'S, 33°40'E), about 8 mi. NW Lilongwe, I saw six adult male *Vidua paradisaea* and also one *Pytilia melba* during a short visit from 26th to 28th March 1967. No *V. obtusa* or *P. afra* were seen. In spite of the widespread occurrence and sympatry of both kinds of whydahs and both pytilias in Malawi, I am including two female whydahs taken at Mbabzi as probably *V. paradisaea*, because if *obtusa* had been there in numbers as great as *paradisaea* I would expect to have seen it. In addition, D. N. Mansfield, in an unpublished manuscript written several years ago and deposited in the *Ostrich* editorial office at the Percy Fitz-Patrick Institute, found *V. paradisaea* common but *V. obtusa* absent at Lilongwe. Mansfield lived in Lilongwe for many years and knew the local birds very well. One of the female whydahs I collected was taken on 26th March and was not laying, and the other (27th March) had an unshelled egg in the oviduct and three fresh post-ovulatory follicles (3.8, 1.9, 1.5 mm; confirmed by serial histological sections) and was breeding. According to Mansfield (in manuscript and in letter), the host of this whydah at Lilongwe is *P. melba*, which nests there from February, through June.

Mwinilunga, Zambia: The Mwinilunga District in Zambia has been well studied in the past 15 years by several ornithologists (Benson & Irwin 1967: xi). All pytilia specimens known from there are *P. afra*; specimens that I have seen were collected from Salujinga, Zambezi Rapids, Kalene Hill, Mundwiji Plain, Sakeji, Lisombo Stream, Mbongo Stream, and Mwinilunga. *P. melba* was reported for Mwinilunga by White (1946: 220), but Benson & Irwin consider this record questionable as no specimens are known. The ♂♂ whydahs known from Mwinilunga District are all *obtusa*; specimens examined were from Zambezi Rapids and Salujinga.

From 2nd to 19th September 1966, we camped for two weeks at Salijunga (10°58'S, 24°07'E) in the northern tip of northwestern Zambia. Although it was late in the dry season and no rains had fallen, green grass was emerging from ground burned over a few weeks earlier, and many deciduous trees were flowering and leafing. Here and at Zambezi Rapids (11°08'S, 24°10'E) *Pytilia afra* was common. An adult male taken on 15th September had large testes (about 4 × 2.5 mm) and was beginning moult of the primaries; although it was in adult plumage it had anterior frontal regions of the skull still unpneumatized. At Zambezi Rapids I shot 8 *P. afra*; one adult ♂ on 7th September was not moulting and had testes 4 × 3 mm, and its skull was partly unpneumatized. Three other ♂♂ taken on 13th to 18th September were moulting and had small testes (1.5 to 2 mm long) and fully pneumatized skulls, suggesting that younger birds bred later in the season than older birds. An adult ♀ on 13th September was in moult and had a small ovary; the other three birds were young in post juvenal moult and had small ovaries. Most of the *Pytilia* were found in flocks, but the largest testes of two ♂♂ suggested breeding. I saw a family group of two adult and three juvenile *P. afra* and a juvenile paradise whydah (presumably *V. obtusa*) in a bush on the bank of the river on 17th September. The young whydah begged and twisted its neck round so that it was begging with its head upside down and it gaped upwards, in a posture like that shown by Nicolai (1964: 176) for other young whydahs. The juvenile whydah at Zambezi Rapids was gray and unstreaked but lacked any red on the rump and it looked larger than the young *Pytilia*. This is an unusually late breeding record for *P. afra*; of the 17 breeding records for Zambia and Malawi listed by Benson *et al.* (1964: 101) and by Benson & Irwin (1967: 116) all were between January and July.

Paradise whydahs at Salujinga and Zambezi Rapids in September were in flocks of 4 to 60 birds. They were shy and did not seem at first to be breeding as I saw no males in full breeding plumage. Of 14 birds collected, 7 (4♂♂, 3♀♀) were juveniles each with a bursa and in moult into sparrowy non-breeding plumage. One (RBP 4059) was moulting its juvenal body feathers while still growing the juvenal rectrices. An adult ♂ (RBP 4091) about half-way through postnuptial body moult on 17th September retained several dark maroon breast feathers and some dark nape feathers from the breeding plumage and could thus be identified directly as *V. obtusa*. The testes were slightly larger than 2 mm and were evidently regressing. This male gave a "woooooee" call like I heard *P. afra* give at Zambezi Rapids. On 13th

[The bursa, see above, according to D. S. Farner (in *Biology and Comparative Physiology of Birds*, ed. A. J. Marshall, 1960) is a structure in the cloaca of young birds. Farner writes (p. 442):- "There is typically in young birds at the junction of the large intestine and the cloaca a dorsal diverticulum, the *bursa of Fabricius*. Subsequently this diverticulum loses its lumen and becomes lymphoid in nature".

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September in a flock of 60 whydahs I saw a male *V. obtusa* in full breeding plumage except for the inner two pairs of rectrices, which were missing. Also collected were a moulting young ♂ (with no juvenal body feathers evident) and five ♀♀. One ♀ had the skull about half pneumatized and had an unconvoluted oviduct and evidently she had not bred; she was perhaps an older bird of the year, as nearly all adult female viduines that I have collected in the breeding season have had the oviducts convoluted, resulting from enlargement in laying. Another ♀ taken at Salujinga was more than halfway through moult with only the outer three primaries worn, and a ♀ at Zambezi Rapids had four old primaries. Two other female whydahs at Zambezi Rapids were in worn plumage and had not begun to moult. One (RBP 4073) on 13th September had a convoluted but regressing oviduct and had no ovarian follicles larger than 1 mm, and the other ♀ (RBP 4033) on 7th September was laying; she had an unshelled egg in the oviduct and another yolky follicle (damaged by shot) in the ovary. The date seemed late for a whydah to be parasitizing *Pytilia afra*, but as noted some *P. afra* were still in breeding condition here, and two local boys who stopped by our camp said they knew the bird (*P. afra*) and it was still breeding, though none of the nests that we found or that they brought in had eggs or young. The skull of the laying whydah was about 30 per cent unpneumatized, a well-pneumatized skull for this species.

The large flock of 60 whydahs was seen for several days feeding in a cleared, fallow field, where they were eating fallen grass seeds, and with the whydahs were several *P. afra*; these did not fly when the whydahs were flushed. We also noted that the juvenile viduines had apparently joined the older whydahs in a flock soon after they were independent. None of the Zambezi Rapids birds had more than a little subcutaneous or body fat, suggesting that they were nonmigratory.

Kasaji, Katanga: In southwestern Katanga as in almost all of the Congo south of the equatorial forest, *Pytilia afra* is the only member of its genus; *P. melba* is restricted to the extreme eastern border of the Congo (Chapin 1954: 511-512). Similarly in the whydahs *V. obtusa* males are known for much of the southern Congo including 20 specimens taken by Fisher at Kasaji, whereas *V. paradisaea* is known from few specimens and these were from the eastern border of the Congo. From the distribution of pytilias and whydahs in the southern Congo, I regard the Kasaji female whydahs as *obtusa*. They were taken in April, May, August, September, and October, and in the first three of these months adult male *obtusa* were taken here in breeding plumage.

Ologesailie, Kenya: On a gravel ridge (01°33'S, 36°28'E) about 31 mi. NE Magadi and a half mile north of the National Historical Site of Ologesailie (=Oloksailie), where the dry climate has left intact hundreds of hand-axes of early man, is a grove of acacias, euphorbias, and other trees and arid-country shrubs. Water is scarce most of the year and the local Masai people visited a temporary water hole beside the road and flushed up scores of finches in May and June 1967, when we camped here. I photographed an adult male *Vidua paradisaea* and two *Pytilia melba* at the water hole and collected four female Paradise Whydahs on 11th to 14th June. Three ♀♀ had a soft egg in the oviduct, and the fourth was about to ovulate a large, yolky follicle and had two large post-ovulatory follicles that were confirmed histologically.

Comparison of female paradise whydahs

Female whydahs taken in localities where only a single kind of male occurs (as described above) are compared for wing length in Table 1. Female *Vidua obtusa* are longer winged, on the average, than female *V. paradisaea*, and

although some overlap occurs the differences in mean wing length (measured in the unflattened manner) are significant ($p < .01$, t -test). All females in the sample with wing length 80 mm or more are *V. obtusa*, and all females with wings 76 mm or smaller are *V. paradisaea*. As 17 of the 30 *obtusa* females had wing lengths of 80 mm or more and 26 of the 35 *paradisaea* females were 76 mm or less, about two-thirds of the female whydahs can be distinguished by wing length alone. The amount of overlap in wing length among females is about the same as among males in breeding plumage taken in the same general areas (Chapin 1922).

No geographic variation in wing length among females of either species is evident in southern and east Africa. Females are like the males in being morphologically similar in southern and east Africa. The only differences apparent within a species in male specimens in breeding plumage examined are in the forms of the tail, especially the innermost, partly concealed pair of display rectrices, but these differences seem to be due solely to the amount of wear and abrasion of the feathers. In the females the variations in plumage colour (buffy or gray) are most likely due to soiling by reddish or blackish dirt, respectively.

The plumage pattern is similar in female *paradisaea* and *obtusa*. The streaking pattern on the back, crown, and breast and the grayness or buffiness of the upperparts and underparts show no consistent differences between the two kinds of females. The two vertical blackish marks on each side of the head, by the ear, are somewhat more pronounced in most *paradisaea* than in most *obtusa* in my series (Fig. 1), but this varies considerably among specimens and some female *obtusa* (e.g. RBP 4090, from Salujinga) in fresh plumage are more distinctly marked than some worn *paradisaea* (e.g. RBP 4745, from Ologesailie).

Bill colour in breeding female *obtusa* taken at Tzaneen and Zambezi Rapids was noted at the time of collection as pinkish-gray, gray, or blackish above, and pinkish, white-gray, or horn below. Breeding female *paradisaea*, on the other hand, had blackish or dark gray bills (usually these were paler on the undersides of the base of the lower mandible). The bill colour difference between these females was apparent in the field; the paler, sometimes pinkish-tinged bill of *obtusa* distinguishes the females of this species from the blackish-billed *paradisaea*. The bill colour difference persists in most museum specimens with *obtusa* females taken in breeding condition having uniformly paler bills than breeding *paradisaea* females (Fig. 1). The bill colours may undergo seasonal changes in the living birds, however. The female *paradisaea* taken at Shorobe, Botswana, in early postnuptial moult had the palest bill of all my *paradisaea* females, and also five female *paradisaea* imported from South Africa in my aviaries lose the dark bill pigment and become pale-billed during their moult but regain the dark colour soon after moult has been completed.

Foot colour of breeding female *obtusa* in my samples was light gray or gray, whereas in breeding female *paradisaea* foot colours were recorded as gray, dark gray, or brown. Perhaps in living birds the foot colours of these females may be different, but no differences are evident in foot colour of the dried museum specimens; all are a dark horn colour.

The iris is dark brown in both kinds of birds.

Comparison of first-year males and juveniles

Wing lengths of males taken in sparrowy plumage (presumably these are first-year males) during the breeding season in my field work were the same



Fig. 1. Female paradise whydahs from southern, south-central, and east Africa. From left to right: (a) 4386, *obtusa* from Tzaneen, Transvaal, (b) 4090, *obtusa* from Salujinga, Zambia, (c) 3976, *paradisaea* from Marble Hall, Transvaal, (d) 4476, *paradisaea* from Sabi Valley, Rhodesia, (e) 4748, *paradisaea* from Ologesailie, Kenya. Note the darker bill and distinct head pattern in *paradisaea*.



Fig. 2. Non-breeding males, females, and juveniles of *paradisaea* and *obtusa*. From left to right: (a) male *paradisaea* (3974) from Marble Hall, Transvaal, (b) male *obtusa* (4075) from Zambezi Rapids, Zambia, (c) female *paradisaea* (3976) from Marble Hall, (d) female *obtusa* (4090) from Salujinga, Zambia, (e) juvenile *paradisaea* (4004) from Marble Hall, (f) juvenile *obtusa* (4034) from Zambezi Rapids, in early post-juvenal moult.

as in breeding males; on the average, in postjuvénal body moult male *obtusa* are larger in wing length (mean = 80.5 mm) than male *paradisaea* (mean of nine ♂♂ = 77.6 mm). Comparing the six Zambezi Rapids male *obtusa* in partial or complete non-breeding, sparrowy plumage with male *paradisaea* from Marble Hall (3 ♂♂), Merensky Reserve (1), Sabi Valley (4), and Ologesailie (1) I can see no difference in the amount of striping, in back colour, or in any other plumage pattern (except for the greater extent of the dark chestnut or maroon feathers on the lower breast in *obtusa*, and perhaps in their lighter auricular pattern). Winterbottom (1939) compared eclipse plumage male *obtusa* from Katanga with *paradisaea* from farther south and found no differences. Bills and feet were black or blackish in my male *paradisaea* with partly enlarged testes but were horn or brownish in males taken during the breeding season but with smaller testes. The testis size in the nine sparrowy males available arrayed in sequence of increasing reddish colour in the breast feather and width of the black streaks on the upper breast shows (Table 2) that males with darker bills and feet and darker feathers on the breast, had larger testes. Probably reproductive hormone levels, which increase at the onset of the breeding season during the pre-nuptial moult, determine the amount of pigment deposited in the bill, feet, and plumage. Black pigment deposition in the growing feathers of *V. paradisaea* is known to be induced experimentally by adding minute amounts of pituitary luteinizing hormone (LH), and this pigmentation response is sometimes used in endocrinology laboratories as a routine bioassay for LH (Hall 1969). In males of *V. obtusa*, the bill colour of the males in eclipse plumage was pale in all except one male in partial breeding plumage, an adult male moulting into sparrowy plumage. Because the samples available of male *paradisaea* and *obtusa* in non-breeding plumage were taken at different stages of the breeding cycle, it is not possible to compare the bill colours of the two species. Adult males in breeding plumage have black bills and blackish or dark brown feet in both species.

Table 2
Correlation of gonadal activity and seasonal sexual characters in first-year male
Vidua paradisaea

Locality	Field No.	Date	Wing length (mm)	Testis l. (mm)	Bill	Feet	% Skull pneumatized	Notes on plumage, other *
Merensky, Tvl.	4001	28th Mar. 66	78	1.0	gray	pale	90	A (large bursa)
Sabi Valley, Rho.	4480	5th Mar. 67	77	1.0	brownish-black above, pinkish-brown below (like 4480)	brown	70	A
Marble Hall, Tvl.	3921	10th Feb. 66	78	1.0	(like 4480)	pale	80	A
Marble Hall, Tvl.	3928	10th Feb. 66	77	1.0	(like 4480)	pale	70	A
Marble Hall, Tvl.	3974	7th Mar. 66	78	2.0	black	dk. brown	80	A-B
Sabi Valley	4562	6th Apr. 67	76	2.2	black	slate	90	B
Sabi Valley	4560	6th Apr. 67	77	2.3	black	slate	90	B-C
Ologesailie, Kenya	4758	14th June 67	79	3.8	black	slate	70	C
Sabi Valley	4569	7th Apr. 67	79	5.0	black	slate	40	C

*Plumage categories—A: black streaks on upper breast slightly darker than female, most under 1.2 mm wide. B: black streaks on upper breast distinct, heavy, many 2.0 mm wide. C: Like B, but many upper breast feathers chestnut; some birds with black feathers on chin.

Male paradise whydahs in non-breeding plumage are usually distinguishable from females in the field by plumage. The black crown stripes and face marks of the males are broader and more distinct than in females, the pale head markings of the males are whiter (less buffy), and the blackish streaks on the upper breast are wider and more distinct (Fig. 2). In addition, some

sparrowy males have dark feathers in the same area of the breast as the black and maroon or chestnut feathers of the breeding males. This field method of sex identification for sparrowy-plumaged whydahs proved correct in all cases where the sexed bird was subsequently collected and sexed by dissection. The sparrowy males in Fig. 2 were chosen for their lack of dark underparts; their streaking is only slightly more distinct than in the females.

Juvenile *paradisaea* and *obtusa* are similar; both are unstreaked brownish-gray, unlike the adult females. The lack of streaking is thought to be mimetic as the young whydahs match their *Pytilia* foster young in appearance and grow up with them in the nest (Nicolai 1964, 1969; Payne 1967b). Too few specimens are available for comparison of any significant mean differences in wing length of juveniles; in plumage they appear nearly identical (Fig. 2). The *V. obtusa* juvenile in Fig. 2 had begun its post juvenal moult and is thus partly in streaked plumage, whereas the juvenile *paradisaea* had not started moult and was in the unstreaked juvenal plumage.

Comparison with west African whydahs

Few specimens of female whydahs are available from west Africa, and for the forms *togoensis* and *interjecta* no females are known. West African females from the ranges of *aucupum* and *orientalis* are similar in size and plumage pattern to *paradisaea* females from southern Africa; some west African and Sudan specimens appear paler. Bill colour in all specimens examined is brown; no black bills were apparent in a series of eight females from Sudan even though some were taken in months when males were in breeding plumage.

On two occasions I saw a male *interjecta* court a female whydah at Zaria, Nigeria, in August 1968, and both females had pale bills. Neither were collected, and when I shot a lone sparrowy whydah on 3rd September here, the bird proved to be a male (RBP 4958). The bill was orange-yellow, the culmen was blackish, and the feet were flesh-grey. Plumage pattern was similar to that of the southern African non-breeding male whydahs. Inasmuch as *V. interjecta* was the only paradise whydah and *Pytilia phoenicoptera* the only pytilia seen at Zaria, this male was an *interjecta*.

Species of the paradise whydahs

Taken together, the morphological differences in both males and females and the behavioural difference between the males as described by Nicolai (1964, 1969) clearly establish the paradise whydahs *V. paradisaea* and *V. obtusa* as two distinct species.

The form *obtusa* has been placed in recent works as a subspecies of "*V. orientalis*" (McLachlan & Liversidge 1957; White 1963; Traylor 1968), but in fact these two forms appear to represent two different species, and *orientalis* is best regarded as a subspecies of *V. paradisaea*. Breeding males of the form *orientalis*, which meets *paradisaea* in Ethiopia and appears to interbreed with it, forming birds of intermediate character (Payne, unpublished), are similar to southern *paradisaea* in their pale nape colour and in wing length; they are more like *obtusa* in the rounded form of the rectrices. The distribution of the northern form *orientalis* and its west African counterpart, *aucupum*, matches closely with that of *Pytilia melba* (the red-lored races) just as southern *paradisaea* lives with the grey-lored races of *P. melba* (Hall & Moreau 1970); these two racial groups of the host species intergrade in north-eastern Africa (Wolters 1963). Thus *orientalis* uses the same host species as *paradisaea* does in its range and the two forms should be considered conspecific. *Obtusa*, on the other hand, mimics the songs and calls of another species of *Pytilia*. At

least some of the viduines that mimic the songs of their hosts are known to select their mates on the basis of the mimetic songs (Payne, in press), and experimental studies of the selective responses of female whydahs to the songs of different kinds of *Pytilia* are now in progress to test the importance of song in mate and host selection in the paradise whydah complex as well. From both these morphological considerations and the songs of the males and the behavioral responses of the females, I suggest that *orientalis* and *aucupum* be regarded as subspecies of *Vidua paradisaea*, the Acacia Paradise Whydah. *Vidua obtusa*, the Broad-tailed Paradise Whydah, is best regarded as a distinct species.

Finally, the long, narrow-tailed forms of whydahs *interjecta* and *togoensis* of west Africa should be regarded as specifically distinct from all of the others, as they occur across thousands of miles in close proximity to the forms *orientalis* and *aucupum* but do not interbreed with them, and they mimic yet another species of pytilia in their song (Nicolai 1964). The forms *interjecta* and *togoensis* replace one another from east to west through the Guinea Woodland region, whereas their song models *Pytilia phoenicoptera* and *P. hypogrammica*, which have identical vocalizations according to Nicolai (1964), replace one another across a moisture gradient north to south. At Zaria and 68 miles northeast of Numan, Nigeria, I have heard male *interjecta* mimicking the only local pytilia, *P. phoenicoptera*. As *interjecta* was described earlier than *togoensis*, the species name of these whydahs is *Vidua interjecta*. These may be called the Exclamatory Paradise Whydahs; in flight the males with their long, slender tails look like airborne exclamations!

Acknowledgments

Specimens from the following museums were examined: American Museum of Natural History, Academy of Natural Sciences of Philadelphia, Berlin Museum, British Museum (Natural History), Field Museum of Natural History, National Museum of Kenya, Livingstone Museum, Museum Royal de l'Afrique Centrale, and National Museum of Rhodesia. I am grateful to the curators of these museums for making available their collections. Field work was supported by the National Science Foundation while I was with the Percy FitzPatrick Institute of African Ornithology. For their suggestions and help during the field work I thank D. H. Eccles, L. Ferguson, M. P. Stuart Irwin, G. L. Lombard, D. Mansfield, I. MacFadyen, A. C. Raines, J. C. Ras, G. T. Roux, M. Slogrove, R. H. N. Smithers, A. Van Reenen, and J. M. Winterbottom.

References:

- Benson, C. W., Brooke, R. K. & Vernon, C. J. 1964. Bird breeding data for the Rhodesias and Nyasaland. *Occ. Pap. Nat. Mus. S. Rhodesia* 27B: 30-105.
- Benson, C. W. & Irwin, M. P. Stuart. 1967. *A contribution to the Ornithology of Zambia* London: Oxford Univ. Press.
- Brooke, R. K. & Cackett, K. E. 1965. Preliminary list of the birds of the central Sabi Valley, Rhodesia. *South Afr. Avifauna Ser.* 31: 1-34.
- Chapin, J. P. 1922. The species and geographic races of *Steganura*. *Amer. Mus. Novit.* 43: 1-12.
- 1954. The birds of the Belgian Congo. Part 4. *Amer. Mus. Nat. Hist. Bull.* 75B.
- Friedmann, H. 1960. The parasitic weaverbirds. *U. S. Nat. Mus. Bull.* 223.
- Hall, B. P. & Moreau, R. E. 1970. *An Atlas of Speciation in African Passerine Birds*. London: Trustees of the British Museum (Natural History).
- Hall, P. F. 1969. Hormonal control of melanin synthesis in birds. *General and Comparative Endocrinology*, suppl. 2: 451-458.
- Immelmann, K., Steinbacher, J. & Wolters, H. E. 1965. *Prachtfinken, I. A. Strilde*. Aachen: Verlag Hans Limberg.
- Irwin, M. P. Stuart & Benson, C. W. 1967. Notes on the birds of Zambia: Part IV. *Arnoldia (Rhodesia)* 3(8).

- McLachlan, G. R. & Liversidge, R. 1957. *Roberts Birds of South Africa*. Cape Town: Trustees of the South African Bird Book Fund.
- Nicolai, J. 1964. Der Brutparasitismus der Viduinae als ethologisches Problem. *Z. Tierpsychol.* 21: 129-204.
- 1969. Beobachtungen an Paradieswitwen (*Steganura paradisaea* L., *Steganura obtusa* Chapin) und der Strohwitwe (*Tetraenua fischeri* Reichenow) in Ostafrika. *J. Orn.* 110: 421-447.
- Payne, R. B. 1967a. *Vidua obtusa* in the Transvaal, South Africa. *Bull. Brit. Orn. Cl.* 87: 93-95.
- 1967b. Interspecific communication signals in parasitic birds. *Amer. Nat.* 101: 363-376.
- in press. Behavior, mimetic songs and song dialects, and relationships in the parasitic indigobirds (*Vidua*) of Africa. *Orn. Monogr.*
- Smithers, R. H. N. 1964. *A Check List of the birds of the Bechuanaland Protectorate and the Caprivi Strip*. Cambridge: Trustees of the National Museums of Southern Rhodesia.
- Traylor, M. A. 1968. Family Ploceidae, subfamily viduinae. In: *Check-list of Birds of the World*, Vol. 14. Ed. R. A. Paynter, Jr. Cambridge, Mass.: Mus. Comp. Zool. Harv.
- White, C. M. N. 1946. The ornithology of the Kaonde-Lunda Province, Northern Rhodesia. Part IV. *Ibis* 88: 206-224.
- Winterbottom, J. M. 1939. A note on the paradise whydahs. *Ostrich* 10: 125-128.
- Wolters, H. E. 1963. Zur Rassengliederung von *Pytilia melba* (L.). *J. Orn.* 104: 185-190.

Taxonomic and distributional notes on the African Chaeturini

by R. K. Brooke

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White (1965) following Lack (1956) placed all the African Spine-tailed swifts in *Chaetura* Stephens 1826. This is a purely new world genus as I have recently shown (Brooke 1970) and the African spine-tails, being relicts of a pre-pleistocene fauna, should be divided among several genera: *Neafrapus* Mathews 1918, *Rhaphidura* Oates 1883, *Telacanthura* Mathews 1918 and *Zoonavena* Mathews 1918. While holding a Frank M. Chapman memorial grant from the American Museum of Natural History in New York I examined many spinetails in the museums listed in Brooke (1969a) to whose authorities I am much obliged for facilities for study. I am also obliged to Dr. A. A. da Rosa Pinto for facilities for study at the Instituto de Investigacao Cientifica de Angola at Sa da Bandeira; to C. W. Benson for data on *Rhaphidura sabini* in the British Museum (Natural History) in London; to P. A. Clancey for the loan of material in the Durban Museum; to A. D. Forbes-Watson for the loan of some of his Mt. Nimba specimens. English names are discussed in Brooke (in press). Nothing is said of *Telacanthura* since my friend, the late Dr. A. De Roo, may have completed his comments on *T. ussberi* (Sharpe) for posthumous publication.

Age and sex dimorphism hardly exists in the Chaeturini. The only way to tell a juvenile specimen is when it is in sufficiently fresh plumage for the pale tips of the three outermost primaries not to have abraded (Brooke 1969b). There is no present evidence that juveniles are mensurally smaller than adults. Sight records have been used where they markedly fill out the range known from specimens bearing in mind that the old world Chaeturini are among the more readily identifiable swifts in the field.

Zoonavena grandidieri grandidieri (Verreaux)

The Brown Spinetail of Madagascar is the only spinetail with a forked tail. The depth (distance between the ends of the webs of the innermost and outermost rectrices with the tail held closed) is 1.5-5.0 av. (22) 3.23 mm. The two outermost rectrices are of equal length unlike the normal situation